
X. Mathematics, Grade 4

Grade 4 Mathematics Test

The spring 2007 grade 4 MCAS Mathematics test was based on learning standards in the Massachusetts *Mathematics Curriculum Framework* (2000). The *Framework* identifies five major content strands, listed below. Page numbers for the grades 3–4 learning standards appear in parentheses.

- Number Sense and Operations (*Framework*, pages 22–23)
- Patterns, Relations, and Algebra (*Framework*, page 32)
- Geometry (*Framework*, page 40)
- Measurement (*Framework*, page 48)
- Data Analysis, Statistics, and Probability (*Framework*, page 56)

The *Mathematics Curriculum Framework* is available on the Department Web site at www.doe.mass.edu/frameworks/current.html.

In *Test Item Analysis Reports* and on the Subject Area Subscore pages of the *MCAS School Reports* and *District Reports*, Mathematics test results are reported under five MCAS reporting categories, which are identical to the five *Framework* content strands listed above.

Test Sessions

The MCAS grade 4 Mathematics test included two separate test sessions. Each session included multiple-choice, short-answer, and open-response questions.

Reference Materials and Tools

Each student taking the grade 4 Mathematics test was provided with a plastic ruler and a grade 4 Mathematics Tool Kit. A copy of the tool kit follows the final question in this chapter. An image of the ruler is not reproduced in this publication.

The use of bilingual word-to-word dictionaries was allowed for current and former limited English proficient students only, during both Mathematics test sessions. No calculators, other reference tools, or materials were allowed.

Cross-Reference Information

The table at the conclusion of this chapter indicates each item's reporting category and the *Framework* learning standard it assesses. The correct answers for multiple-choice and short-answer questions are also displayed in the table.

Mathematics

SESSION 1

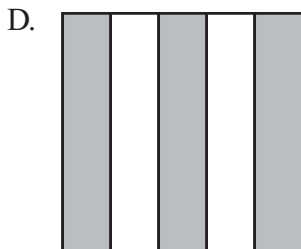
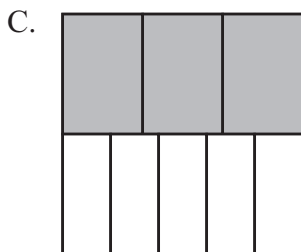
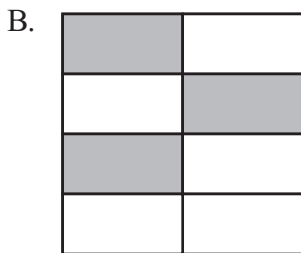
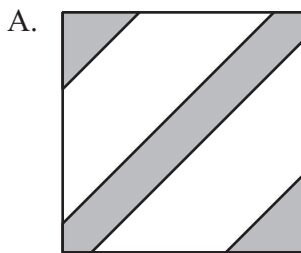
You may use your tool kit and MCAS ruler during this session.
You may **not** use a calculator during this session.



DIRECTIONS

This session contains twelve multiple-choice questions, two short-answer questions, and three open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 1 Which of the following squares has $\frac{3}{5}$ shaded?



- 2 Karen has only \$10 bills and \$1 bills in her wallet. She made the table below to show how much money she has.

Karen's Money

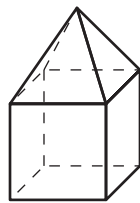
Type of Bill	Number of Bills
\$10 bill	11
\$ 1 bill	7

Based on the table, how much money does Karen have in her wallet?

- A. \$1107
B. \$117
C. \$107
D. \$17

- 3 Which of the following is the **best** way for Mr. Gomez to show the change in the average temperature each day?
- A. a line graph
 - B. a tally chart
 - C. a pictograph
 - D. a circle graph

- 4 Tamika made a model of a house, as shown below, by gluing together a cube and a square pyramid.



How many faces does the model of the house have?

- A. 4
- B. 8
- C. 9
- D. 11

- 5 Last summer, Max earned 5 stickers for every book he read. He earned 40 stickers in all for reading books. Which number sentence could be used to find b , the number of books Max read?
- A. $b \div 5 = 40$
 - B. $5 + b = 40$
 - C. $b - 5 = 40$
 - D. $5 \times b = 40$

- 6 All of the numbers Cindy wrote in the box shown below are even numbers **and** multiples of 3.

6	36
12	24

Which of the following is also an even number **and** a multiple of 3?

- A. 13
- B. 21
- C. 26
- D. 30

- 7 Last month, 3801 people ate at Tony's Pizza. This month, 2765 people ate at Tony's Pizza.

How many more people ate at Tony's Pizza last month than this month?

- A. 1036
- B. 1044
- C. 1146
- D. 1164

- 8 The table below shows the amounts of money needed to park for different numbers of minutes. Each 6 minutes costs the same amount of money.

Parking Amounts

Amount of Money	Time (in minutes)
5 cents	6
10 cents	12
15 cents	18
20 cents	24
25 cents	30

How much money will it cost to park for 60 minutes?

- A. 50 cents
- B. 55 cents
- C. 65 cents
- D. 72 cents

- 9 Ms. Rodriguez is going to make 8 bows. She needs 28 inches of ribbon to make each bow.

Which of the following expressions has a value that is **closest** to the amount of ribbon, in inches, Ms. Rodriguez will need?

- A. 5×20
- B. 8×20
- C. 8×30
- D. 10×30

Question 10 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 10 in the space provided in your Student Answer Booklet.

- 10 The chart below shows the numbers of books four children read during July.

Books Read in July

Child	Number of Books
Joy	15
Mike	6
Carol	9
Randy	12

- a. What is the total number of books the four children read during July? Show your work or explain how you got your answer.
- b. In your Student Answer Booklet, create a pictograph that displays the information from the chart. Be sure to include a title, correct labels, and a key for your pictograph. Your key must **not** represent only 1 book.

Questions 11 and 12 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 11 Angelina wrote the number pattern below.

101, 122, 143, 164, 185, ?

She adds the same number each time to find the next number in the pattern.

What is the next number in Angelina's pattern?

- 12 Compute:

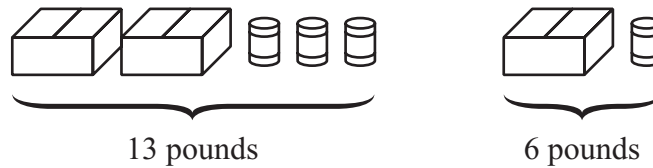
$$651 \div 3$$

Question 13 is an open-response question.





- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 13 in the space provided in your Student Answer Booklet.

13 Ms. Lin made the models shown below.

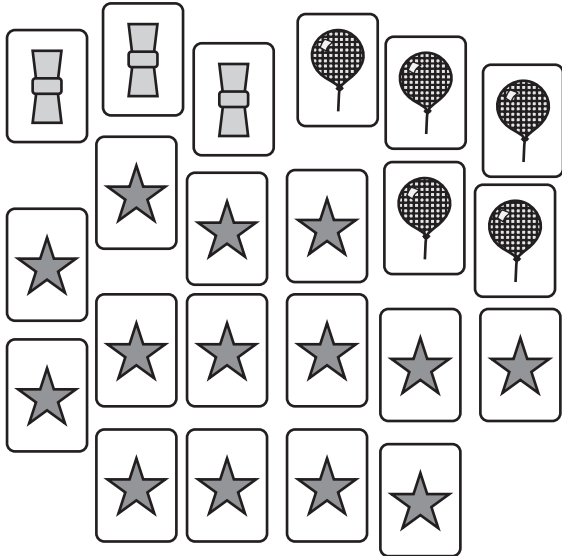


Each  has the same weight. Each  has the same weight.

- What is the weight, in pounds, of 1 ? Show your work or explain how you got your answer.
- What is the weight, in pounds, of 1 ? Show your work or explain how you got your answer.
- What is the **least** number of  and  that have a total weight of 21 pounds? Show your work or explain how you got your answer.

Mark your answers to multiple-choice questions 14 through 16 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

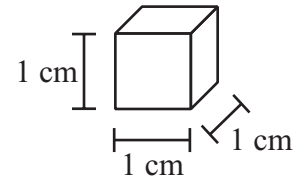
- 14 Rhonda put the cards shown below into an empty bag and mixed them up. The back of each card is blank.



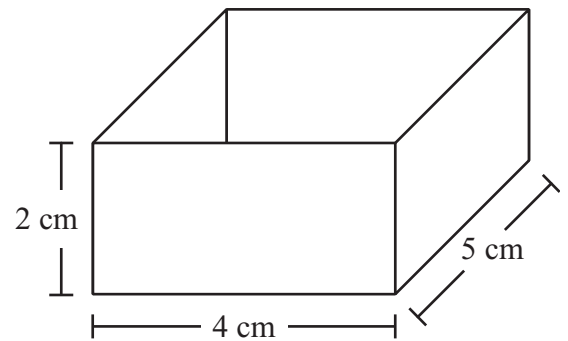
If Rhonda picks 1 card without looking, which of the following best describes the chances that she will pick a card with a star on it?

- A. certain
- B. likely
- C. unlikely
- D. impossible

- 15 Elin has centimeter blocks like the one shown below.



She also has a box with the length, width, and height shown below.



Which of the following is best represented by Elin filling the box with centimeter blocks?

- A. the area of the box
- B. the perimeter of the box
- C. the weight of the box
- D. the volume of the box

- 16 The table below shows the number of buttons that were made at a button factory each week for three weeks.

Buttons Made

Week	Number of Buttons
Week 1	84,503
Week 2	80,968
Week 3	84,551

Which of the following shows the weeks in order from the week with the **greatest** number of buttons made to the week with the **least** number of buttons made?

- A. Week 1, Week 3, Week 2
- B. Week 2, Week 3, Week 1
- C. Week 2, Week 1, Week 3
- D. Week 3, Week 1, Week 2

Question 17 is an open-response question.

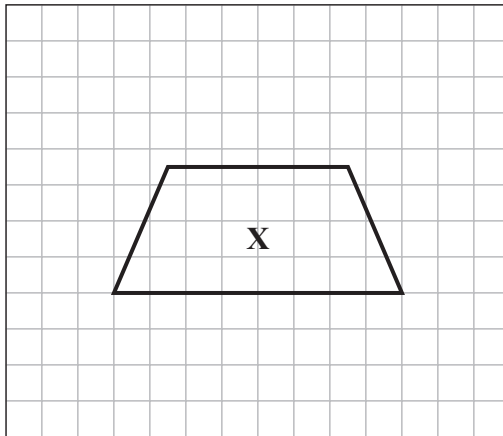
- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 17 in the space provided in your Student Answer Booklet.

17 Jason drew a closed shape with the properties listed below.

- It has exactly four angles.
 - All angles are right angles.
 - Opposite sides are congruent.
 - Opposite sides are parallel.
- a. On the grid in your Student Answer Booklet, draw a shape that has the same properties as Jason's shape.
- b. On the grid in your Student Answer Booklet, draw a **different** shape that also has the same properties as Jason's shape.

Jason also drew trapezoid X shown on the grid below.



- c. List 3 properties of trapezoid X.

Mathematics

SESSION 2

You may use your tool kit and MCAS ruler during this session.
You may **not** use a calculator during this session.

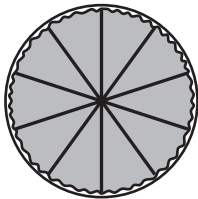


DIRECTIONS

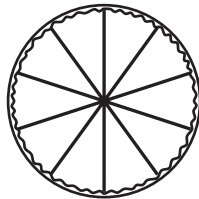
This session contains seventeen multiple-choice questions, three short-answer questions, and two open-response questions. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 18 Pat made the cakes shown below for a bake sale.

Chocolate Cake



Vanilla Cake

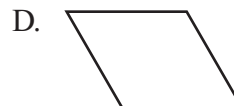
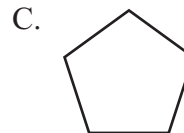
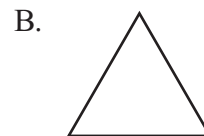
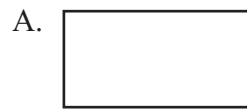


She sold $\frac{9}{10}$ of the chocolate cake and $\frac{6}{10}$ of the vanilla cake.

Which of the following fractions shows how much **more** chocolate cake was sold than vanilla cake?

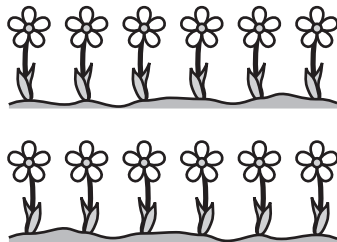
- A. $\frac{2}{10}$
- B. $\frac{3}{10}$
- C. $\frac{4}{10}$
- D. $\frac{5}{10}$

- 19 Which of the following shapes has **only** acute angles?



- 20 Which of the following does **not** equal 1500?
- A. 3×500
 - B. 300×5
 - C. 30×50
 - D. 300×50

- 21 Ryan picked 6 of the flowers shown below.



He correctly wrote two fractions to represent the part of the group of flowers he picked.

Which two fractions could Ryan have written?

- A. $\frac{1}{2}$ and $\frac{6}{12}$
- B. $\frac{6}{12}$ and $\frac{1}{6}$
- C. $\frac{1}{2}$ and $\frac{4}{6}$
- D. $\frac{6}{12}$ and $\frac{2}{3}$

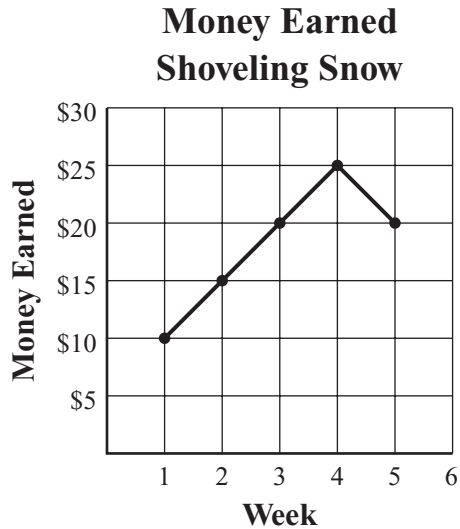
- 22 Which of the following shows the number 0.45 written in words?
- A. forty-five
 - B. four and five tenths
 - C. four and five hundredths
 - D. forty-five hundredths

- 23 Kyle put 50 pickles on 10 sandwiches. He put the same number of pickles on each sandwich.

Which of the following number sentences can be used to find how many pickles Kyle put on each sandwich?

- A. $50 - 10 = \square$
- B. $50 \times 10 = \square$
- C. $50 + 10 = \square$
- D. $50 \div 10 = \square$

- 24 Jamie made the line graph below to show how much money he earned shoveling snow each week for five weeks.



Based on the information in the graph, which of the following statements is true?

- A. Most weeks Jamie earned more money than the week before.
- B. Each week Jamie earned more money than the week before.
- C. Most weeks Jamie earned less money than the week before.
- D. Each week Jamie earned less money than the week before.

- 25 The total cost of 2 pencils is 30¢. Each pencil costs the same amount. What is the total cost of 3 pencils?

- A. 15¢
- B. 33¢
- C. 45¢
- D. 90¢

- 26 Jake is 52 inches tall. Which of the following measurements is the same as 52 inches?

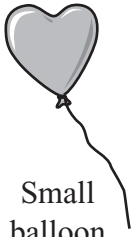

- A. 4 feet 2 inches
- B. 4 feet 4 inches
- C. 5 feet 2 inches
- D. 5 feet 4 inches

Question 27 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 27 in the space provided in your Student Answer Booklet.

- 27 At The Village Gift Shop, balloons are sold in two different sizes. The picture below shows the cost of each size of balloon.

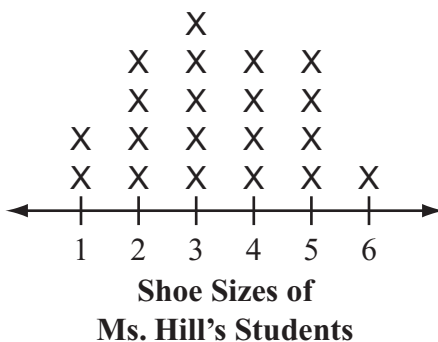
 Small balloon \$1.25	 Large balloon \$2.99
Prices include tax.	

- a. Kiki is buying 2 small balloons and 1 large balloon. What is the total cost of her three balloons at The Village Gift Shop? Show your work or explain how you got your answer.
- b. Kiki gave the clerk \$6 to pay for her three balloons. How much change should Kiki receive? Show your work or explain how you got your answer.
- c. Sam has \$10 to buy balloons at The Village Gift Shop. He will follow all of the rules listed below to choose his balloons.
 - He will buy at least one of each size of balloon.
 - He will buy as many balloons as he can.
 - He will spend as close to \$10 as he can without going over.

Using his rules, how many small balloons and large balloons can Sam buy for \$10? Show your work or explain how you got your answer.

Questions 28 and 29 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

28 The line plot below shows the shoe sizes of all the students in Ms. Hill’s class.



How many students in Ms. Hill’s class have a shoe size **larger** than 4?

29 Ms. Chan bought 15 shirts. Each shirt cost \$18, including tax. What was the total cost of the shirts?

Question 30 is a short-answer question. Write your answer to this question in the box provided in your Student Answer Booklet. Do not write your answer in this test booklet. You may do your figuring in the test booklet.

- 30 Pedro wrote the number sentences below.

$$36 = \square \times 4$$

$$\square \times \triangle = 18$$

The value of \square is the same in both sentences. Both of Pedro's number sentences are true. What is the value of \triangle ?

Question 31 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 31 in the space provided in your Student Answer Booklet.

- 31** Three classes will go to the book fair at Carter Elementary School. The first class will arrive at the book fair at the time shown on the clock below.



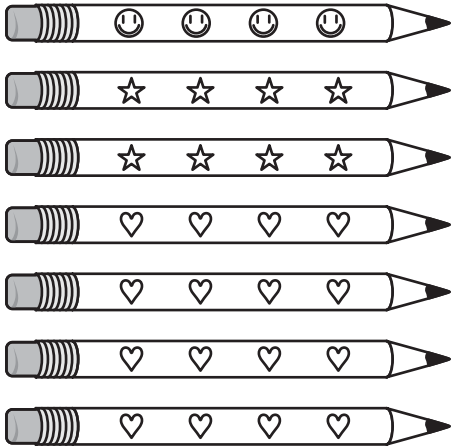
- a. At what time will the first class arrive at the book fair?

Each class will spend 30 minutes at the book fair and then leave. The second class will arrive at the book fair as the first class leaves, and the third class will arrive as the second class leaves.

- b. What is the total amount of time that all three classes will spend at the book fair? Show or explain how you got your answer.
- c. What time will it be when the third class **leaves** the book fair? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 32 through 39 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 32 Ms. Wang has the pencils shown below in her desk.

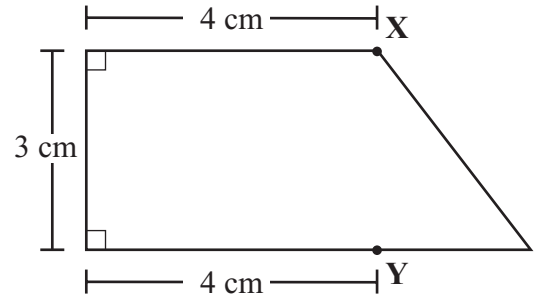


She took one pencil out of her desk without looking.

What is the probability that Ms. Wang took out a pencil with stars on it?

- A. 1 out of 3
- B. 1 out of 7
- C. 2 out of 5
- D. 2 out of 7

- 33 Rosetta will cut the paper shape shown below in a straight line from point X to point Y .



What two shapes will Rosetta have after she cuts the paper?

- A. a square and a triangle
- B. a square and a trapezoid
- C. a rectangle and a triangle
- D. a rectangle and a parallelogram

- 34 The manager of a ball factory made the table below to show the number of balls that were made at the factory each day for two weeks.

**Balls Made at Ball Factory
for Two Weeks**

Day	Number of Balls Made First Week	Number of Balls Made Second Week
Monday	1765	1816
Tuesday	1740	1794
Wednesday	1698	1750
Thursday	1542	1675
Friday	1505	1610

Based on the information in the table, which of the following is true about the number of balls made each day for these two weeks?

- A. The same number of balls were made each day.
- B. The least number of balls were made at the end of the second week.
- C. More balls were made at the end of each week than at the beginning of each week.
- D. More balls were made at the beginning of each week than at the end of each week.

- 35 Last week, 228 fourth-grade students rode 4 buses on a field trip. The same number of students rode on each bus.

How many students rode on each bus?

- A. 52
- B. 57
- C. 62
- D. 67

- 38 The table below shows the different numbers of boxes that are needed to hold different numbers of jars. Each box holds the same number of jars.

Jars in Boxes

Number of Jars	Number of Boxes
12	2
18	3
24	4
30	5
36	6
42	7

How many jars does each box hold?

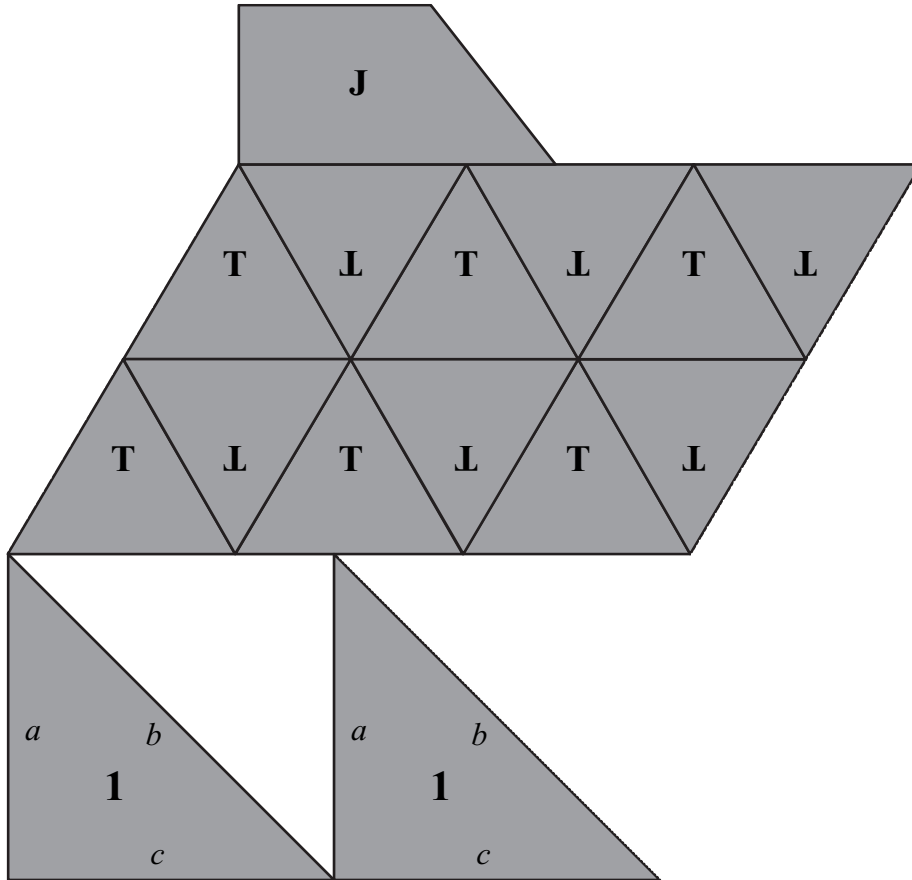
- A. 6
- B. 8
- C. 10
- D. 12

- 39 Which of the following decimal numbers is equivalent to $\frac{6}{10}$?

- A. 0.06
- B. 0.6
- C. 6.0
- D. 6.10

Massachusetts Comprehensive Assessment System

Grade 4 Mathematics Tool Kit



Grade 4 Mathematics
Spring 2007 Released Items:
Reporting Categories, Standards, and Correct Answers

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	255	<i>Number Sense and Operations</i>	4.N.3	D
2	255	<i>Number Sense and Operations</i>	4.N.1	B
3	256	<i>Data Analysis, Statistics, and Probability</i>	4.D.1	A
4	256	<i>Geometry</i>	4.G.1	C
5	256	<i>Patterns, Relations, and Algebra</i>	4.P.2	D
6	256	<i>Number Sense and Operations</i>	4.N.7	D
7	257	<i>Number Sense and Operations</i>	4.N.10	A
8	257	<i>Patterns, Relations, and Algebra</i>	4.P.6	A
9	257	<i>Number Sense and Operations</i>	4.N.17	C
10	258	<i>Data Analysis, Statistics, and Probability</i>	4.D.3	
11	259	<i>Patterns, Relations, and Algebra</i>	4.P.1	206
12	259	<i>Number Sense and Operations</i>	4.N.13	217
13	260	<i>Patterns, Relations, and Algebra</i>	4.P.4	
14	261	<i>Data Analysis, Statistics, and Probability</i>	4.D.6	B
15	261	<i>Measurement</i>	4.M.1	D
16	262	<i>Number Sense and Operations</i>	4.N.2	D
17	263	<i>Geometry</i>	4.G.2	
18	264	<i>Number Sense and Operations</i>	4.N.18	B
19	264	<i>Geometry</i>	4.G.4	B
20	265	<i>Number Sense and Operations</i>	4.N.11	D
21	265	<i>Number Sense and Operations</i>	4.N.4	A
22	265	<i>Number Sense and Operations</i>	4.N.6	D
23	265	<i>Number Sense and Operations</i>	4.N.10	D
24	266	<i>Data Analysis, Statistics, and Probability</i>	4.D.3	A
25	266	<i>Patterns, Relations, and Algebra</i>	4.P.5	C
26	266	<i>Measurement</i>	4.M.2	B
27	267	<i>Number Sense and Operations</i>	4.N.10	
28	268	<i>Data Analysis, Statistics, and Probability</i>	4.D.3	5
29	268	<i>Number Sense and Operations</i>	4.N.10	\$270
30	269	<i>Patterns, Relations, and Algebra</i>	4.P.3	2
31	270	<i>Measurement</i>	4.M.3	
32	271	<i>Data Analysis, Statistics, and Probability</i>	4.D.4	D
33	271	<i>Geometry</i>	4.G.9	C
34	272	<i>Data Analysis, Statistics, and Probability</i>	4.D.3	D
35	272	<i>Number Sense and Operations</i>	4.N.13	B
36	273	<i>Patterns, Relations, and Algebra</i>	4.P.5	D
37	273	<i>Data Analysis, Statistics, and Probability</i>	4.D.5	D
38	274	<i>Patterns, Relations, and Algebra</i>	4.P.1	A
39	274	<i>Number Sense and Operations</i>	4.N.5	B

* Answers are provided here for multiple-choice items and short-answer items only. Sample responses and scoring guidelines for open-response items, which are indicated by shaded cells, will be posted to the Department's Web site later this year.